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AN ANALYSIS OF SOCIAL HOUSING PROCUREMENT TECHNIQUE PERFORMANCE

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SUMMARY

An analysis was conducted on data derived from CMHC 2252's, Notices of commitment, on CMHC-delivery social housing projects between 1978 and 1985 inclusive.

The purpose of the analysis was to compare the relative performance of three basic approaches to project development - General Contract, Design Build and Turnkey, and Construction Management. It was also intended to determine if general expectations with respect to differences in costs and the risk of cost over-runs with each approach were supported in CMHC's experience.

The study shows that Construction Management had the lowest overall cost (measured as a percentage of MUP), with 88.1%, as compared to General Contract at 94.9% and Design Build-Turnkey at 97.8%.

Construction Management provided the lowest incidence and magnitude of cost over-runs at 30.86% and $75 492, compared to General Contract at 34.57% and $222 224 and Design Build-Turnkey at 35.90% and $476 317.

On cost reductions, General Contract averaged $73 701 on 32.25% of the cases, compared to $69 376 average reduction on 31.48% of Construction Management projects and $48 739 average for 26.50% of Design Build-Turnkey projects.

The relative performance has changed over time, with Construction Management showing the greatest increase, to 95.8% of MUP over 1984-85.

AN ANALYSIS OF SOCIAL HOUSING PROCUREMENT TECHNIQUE PERFORMANCE

PURPOSE: This analysis was conducted in order to assess the cost-effectivenes of the major approaches to project development utilized under the Sec. 56.1 Social Housing Program in effect between 1978 and 1985. The same basic techniques are in use in the 1986 Non-Profit Program and the Federal Co-operative Housing Program. The focus of the analysis is on the relative costs of each approach at initial and final commitment stages and the relative risks of cost over-runs and potential of reductions.

TERMS: Procurement technique refers to the approach chosen by the sponsor of a project (non-profit group or co-operative) for the acquisition and the physical development of their project through the construction/rehabilitation phase.

The major techniques which have been employed are described in general terms as follows:

General Contract: The sponsor buys the site and hires an architect to design the building. A contractor is retained to build the structure under a contract, usually at a fixed price. The contractor may be selected on the basis of an invitational or public tender or on the basis of closed negotiations with a single builder.

Design Build: The sponsor buys the site and hires a contractor to design and build the structure according to the sponsors specified requirements. Frequently, the builder owns the site and offers a package of site, design and construction for an overall fixed price. Sponsors also use a form of the Design Build technique which has been referred to as "Modified Turnkey". This is a Design Build Contract in which there is a provision for the group to buy the site before the start of construction. The builder may receive payments throughout construction, but the developer guarantees the total costs of the project on completion.

Turnkey: This is a special case of Design Build, wherein the developer provides the complete package for a fixed price and receives no payment until the completed building is turned over to the purchaser. Few projects are developed under pure turnkey contracts. In view of the disadvantage that any land transfer tax then applies to the site and buildings, most groups opt to buy the site before the start of construction.

Given that both the Design Build and the Turnkey techniques generally feature a total fixed price for site acquisition, design and other soft costs, interest costs during construction and the complete construction costs; the two approaches are generally assumed to have the same cost and cost over-run risk considerations. Therefore, Turnkey will be included under the Design Build category for the purpose of this study.

Construction Management: The sponsor buys the site, hires the architect and other professionals directly and retains a construction manager (individual or firm) to coordinate the calling of tenders for the various trades as well as to supervise, coordinate and manage costs and payments advanced during construction. This approach is equivalent to the project owner acting as its own general contractor, using the construction manager as its agent.

THEORETICAL EXPECTATIONS:

Using the simplified categories of 1. General Contract, 2. Design Build (including Turnkey) and 3. Construction Management, the basic expectations of costs and cost over-run risks are ranked in the following order:

	Costs	Overrun Risk
Design Build	Highest	Lowest
General Contract	Moderate	Moderate
Construction Management	Lowest	Highest

The reasons for these expectations are as follows:

Under the Design Build approach, the developer is generally guaranteeing the final price of the completed project, and in establishing a price, includes a mark-up on sub-contracts and a buffer for unexpected cost increases on all of the components of the guaranteed price. In the general contract approach, this mark-up and buffer are not included on items outside of the contract price. The Construction Management approach does not include the buffer nor mark-up on the sub-trade contracts, and does not provide fixed prices beyond the sum of the trade contracts (which by CMHC policy must represent at least 80% of the construction costs, there being other material and labour costs which cannot be covered by contract). The potential for savings and cost over-runs is therefore greatest with Construction Management.

The capability of the actors involved impacts on the relative performance of the technique employed. For example, if a contract under the general contract or design-build approach allows advances and the developer or builder cannot meet his financial obligations despite his guarantee, there may nevertheless be overruns. The incompetence of the construction manager as the project proceeds may likewise result in cost overruns.

Construction Management is frequently used with existing projects, as contractors are seldom able to provide reasonable fixed prices on work in which the full scope can only be determined after the building is gutted. It may also be used in some cases in order to bring costs down within MUP by avoiding the general contractor's mark up.

RESEARCH METHOD: The relative performance of the techniques was assessed using a special data base developed specifically for this purpose. The data base was developed by creating an initial data set drawn from the Detailed Project Data system on all projects with final cost data. Original costs were then added by reference to the original hard copy of the Notice of Commitment (CMHC 2252).

The special data base contained, in each case, the program year, the branch code, the original cost estimates, the final costs, the Maximum Unit Price (MUP) and indicators of new vs. existing project type and procurement technique. The procurement categories are: (1) General Contract, (2) Design-build (including Turnkey); and (3) Construction Management.

Performance was defined in terms of the capital costs of all projects in a category as a percentage of the cumulative Maximum Unit Price (MUP) for the category in order to control for variations in unit mix and location between the three procurement techniques.

DATA BASE: This analysis is based on 1159 CMHC projects committed between 1978 and 1985, all of which are at final costs.

In both analyses, the provincially-delivered projects have been excluded since the detailed application of CMHC policies and procedures on procurement cannot be assumed. Special Purpose projects have also been eliminated in view of the confounding effects on a relatively high incidence of equity involvement. This could also be a factor in public non-profit projects (e.g. through land cost write-downs and adjustments), which are largely provincial-delivered. 47 projects at final cost were omitted from the analysis as their commitment cost estimates could not be verified.

RESEARCH RESULTS:

The analysis yielded the results provided in the attached appendices A and B, the former showing the average percentage of MUP at and rate of change between commitment and final costs, by technique by time period and by new vs. existing. The second shows the incidence and average size of increases and decreases, by technique by time period.

CONCLUSION:

At commitment, those projects employing Construction Management had the lowest percentage of Maximum Unit Prices (MUP):

General Contract	91.3%
Design Build-Turnkey	92.5%
Construction Management	87.9%
Overall	91.1%

At final costs, Construction Management had the lowest percentage of MUP:

General Contract	94.9%
Design Build-Turnkey	97.8%
Construction Management	88.1%
Overall	94.7%

With respect to cost overruns, Construction Management has the lowest rate of increase between commitment and final costs:

General Contract	3.9%
Design Build-Turnkey	5.8%
Construction Management	0.1%
Overall	3.9%

In terms of the incidence of loan increases, Construction Management has both the lowest incidence and the lowest magnitude of overruns:

	Incidence(%)	Average ($)
General Contract	34.57	222 224
Design Build-Turnkey	35.90	476 317
Construction Management	30.86	75 492
Overall	34.22	170 557

General Contract, however, has the highest incidence and magnitude of cost reductions:

	Incidence(%)	Average ($)
General Contract	32.25	73 701
Design Build-Turnkey	26.50	48 739
Construction Management	31.48	69 376
Overall	33.79	71 184

In view of the foregoing analysis of historical data, procurement technique priorities would seem to be:

Construction Management
General Contract
Design Build Turnkey

It should be recognized that the gap between the techniques has reduced over time, perhaps as a consequence of a restraint on MUP leading to a reduction in profit margins on both General Contracts and Design Build or Turnkey, a reduction not available in Construction Management.

	Percentage MUP at Final Costs		
	79-81	82-83	84-85
General Contract	93.3	96.5	94.3
Design Build-Turnkey	96.7	100.0	92.3
Construction Management	82.6	91.7	95.8
Overall	92.5	96.7	94.2

From the above, it appears that the advantage of Construction Management had been eliminated by 1984-85, primarily through the increases on new projects. This conclusion may be premature in view of the number of final cost data still outstanding on 1984-85 projects.

Both Construction Management and General Contract are as likely to experience increases as decreases, while design Build Turnkey projects are more likely to have increases than decreases. The average size of increases far out weighs the average decrease for both General Contract and Design Build-Turnkey, while there is little difference in the level of increases and decreases on Construction Management.

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APPENDIX A

Comparative Performance of Procurement Techniques
As a Percentage of Maximum Unit Prices

General Contract	# Projects	Original %	Final %	% Change
1978-81	241	87.7	93.3	+6.4
1982-83	363	94.6	96.5	+2.0
1984-85	277	90.5	94.3	+4.2
New	561	93.0	96.2	+3.4
Existing	320	82.4	88.0	+6.9
Overall	881	91.3	94.9	+3.9
Design Build-Turnkey				
1978-81	28	92.6	96.7	+4.4
1982-83	58	92.5	100.0	+8.9
1984-85	29	92.3	92.3	-0.0
New	104	93.0	98.5	+5.9
Existing	11	78.6	79.7	+1.4
Overall	115	92.5	97.8	+5.8
Construction Management				
1978-81	62	84.2	82.6	-1.8
1982-83	60	89.9	91.7	+2.0
1984-85	39	95.6	95.8	+0.2
New	79	93.8	93.1	-0.8
Existing	82	76.7	78.5	+2.3
Overall	161	87.9	88.1	+0.1
All Techniques				
1978-81	331	88.3	92.5	+4.8
1982-83	482	93.6	96.7	+3.3
1984-85	346	91.0	94.2	+3.5
New	744	93.1	96.4	+3.6
Existing	415	80.8	85.2	+5.5
Overall	1 159	91.1	94.7	+3.9

APPENDIX B

Comparative Performance of Procurement Techniques
On The Incidence and Magnitude of Increases and Decreases

	% Increases	Average Magnitude ($)	% Decreases	Average Magnitude ($)
General Contract				
1978-81	37.29	321 583	37.29	71 800
1982-83	36.88	181 319	36.07	103 553
1984-85	29.14	178 771	32.37	31 842
Overall	34.57	222 224	35.25	73 701
Design Build-Turnkey				
1978-81	50.00	506 126	7.14	445 914
1982-83	32.20	667 271	32.20	19 739
1984-85	30.00	26 823	33.33	24 578
Overall	35.90	476 317	26.50	48 739
Construction Management				
1978-81	24.19	41 299	37.10	138 436
1982-83	31.15	145 436	26.23	69 880
1984-85	41.03	24 489	30.77	28 631
Overall	30.86	75 492	31.48	69 376
All Techniques				
1978-81	35.93	308 078	34.73	81 915
1982-83	35.73	229 445	34.29	90 791
1984-85	30.46	142 582	32.18	30 861
Overall	34.22	170 557	33.79	71 184